

CURRICULUM VITAE

KENNETH R. MORRIS

STATEMENT OF RESEARCH INTERESTS

The majority of my research is in the emerging discipline of Pharmaceutical Material Science. This area can be described as the study of the impact of the physico-chemical properties of formulation components on the performance of the final pharmaceutical dosage form. These properties include: particle size, shape, surface area, and charge; crystal structure, lattice energy, forms (i.e.: polymorphs and hydrates), morphology; relative crystallinity (and amorphous content); hygroscopicity; and solubility. These properties affect powder flow, mixing, compaction, and physical stability, which, in turn, determine the dosage form performance. Changes in these critical properties that occur during processing can, therefore, alter dosage form performance. A focus of our research is the use of advanced analytical techniques to follow these properties throughout the manufacturing process. The techniques include: powder and single crystal x-ray diffraction, differential scanning calorimetry, thermal gravimetric analysis, mid and near diffuse reflectance Fourier transform infra-red spectrophotometry, dielectric spectroscopy, and molecular and crystallographic modeling.

EDUCATION

B.S., Eastern Michigan University, April 1978, dual major in Chemistry and Aquatic Biology.

M.S. course work completed, University of Georgia, 1981-1984, in Physical Chemistry.

M.S., University of Arizona, August 1986, in Pharmaceutical Chemistry, thesis title; The solubility of hydrophobic pollutants in water-cosolvent mixtures.

Ph.D., University of Arizona, January 1988, in Pharmaceutics, thesis title; Solubility of aromatic compounds in mixed solvents.

WORK EXPERIENCE

Professor – Department of Industrial and Physical Pharmacy; Purdue University; West Lafayette, IN; 2002-present.

Associate Department Head - Department of Industrial and Physical Pharmacy; Purdue University; West Lafayette, IN; 2001-present.

Associate Professor - Department of Industrial and Physical Pharmacy; Purdue University; West Lafayette, IN; 1997-2002.

Principal Investigator - Head of Preformulation and Analytical Chemistry Groups; Bristol-Myers Products Research and Development; Hillside, New Jersey; 1995-1997.

Senior Research Investigator III - Head of Preformulation Group; Bristol-Myers Products Research and Development; Hillside, New Jersey; 1993-1995.

Senior Research Investigator II - Physical Pharmacy Group; Pharmaceutical Research and Development; Bristol-Myers Squibb Pharmaceutical Research Institute; New Brunswick, New Jersey; 1992-1993.

Senior Research Investigator I - Physical Pharmacy Group; Pharmaceutical Research and Development; SQUIBB Institute for Medical Research; New Brunswick, New Jersey; 1990-1992.

Research Investigator - Physical Pharmacy Group; Pharmaceutical Research and Development; SQUIBB Institute for Medical Research; New Brunswick, New Jersey; 1988-1990.

Research Assistant - Pharmaceutical Sciences; University of Arizona; Tucson, Arizona; 1984-1987.

Associate Faculty- Pima Community College; Tucson, Arizona; 1986.

Chemist - U.S. Environmental Protection Agency; Athens, Georgia; 1979-1984.

Biological Technician - Great Lakes Research Vessels; U.S. Fish and Wildlife Service; Ann Arbor, Michigan; 1977-1979.

Teaching Assistant- Biochemistry Laboratory; Eastern Michigan University; Ypsilanti, Michigan; 1976-1977.

COURSES CURRENTLY TAUGHT

IPPH 100 – Orientation for BSPS (B.S. in Pharmaceutical Sciences) students.

IPPH 490 – Solubility Theory (undergraduate course taught on an ad hoc basis).

IPPH 490 – IPPH Research Project (undergraduate course taught on an ad hoc basis).

IPPH 587 – Pharmaceutical Solids (graduate).

IPPH 562 – Manufacturing Processes and Unit Operations (graduate-undergraduate).

IPPH 671 – Advanced Pharmaceutical Processing (graduate).

SSCI Solids Short Courses – Three-day intensive short course on the characteristics and characterization of pharmaceutical solids and the development implications. Taught publicly and privately.

VISITING PROFESSOR

Institute of Pharmacy; Department of Pharmaceutical Technology; University of Innsbruck; Innsbruck, Austria, Summer – 2000.

GRADUATE STUDENTS

College of Pharmacy, Rutgers University

Co-advisor (as adjunct professor) for two successful Ph.D. students. (1990-1997)

School of Pharmacy and Pharmacal Science, Purdue University

Former Graduate Students

Current Graduate Students

Advisory Committee Member for twelve (12) other graduate students

SCHOOL AND UNIVERSITY COMMITTEES

Chair BSPS Committee

Member Grievance Committee

Member Allen Chao Center Committee for Planning and Design of Building

Member Assessment Committee

MEMBERSHIPS

American Association of Pharmaceutical Scientists.

American Crystallographic Association.

American Chemical Society.

NATIONAL OFFICES AND APPOINTMENTS

Member of ad hoc National Cancer Institute Grant Review Committee, Bethesda MD, 1989.

Member AAPS-FDA PQRI Bulk Drug Particle Size and Particle Characteristics Committee
(2000-2002)

Member FDA Process Analytical Technologies Subcommittee of the Advisory Committee
for Pharmaceutical Science (2002-2004).

Member—FDA Science Advisory Board (2001-2003)

AWARDS AND HONORS

Outstanding Research Award, Environmental Protection Agency Environmental Research Laboratory, 1983.

EPA Research Paper of the Year for S. W. Karickhoff and K. R. Morris, Impact of tubificid oligochaetes on pollutant transport in bottom sediments, 1987.

1994 Fred Simon Award for Best Paper in the *PDA Journal of Pharmaceutical Science and Technology* for: A prediction of lyophile collapse temperature by dielectric analysis.

1996/1997 Presidents Award, Bristol Myers Products R&D.

2000-2002 - Purdue Research Foundation Grant Award: Study of eutectic formation on compaction.

PATENTS

Methods of searching for and generating high free energy forms – In conjunction with SSCI Inc..

Methods of searching for solid forms and screening a sample according to its forms - In conjunction with SSCI Inc..

Capillary Method for the Isolation of High Free Energy Forms of Materials - In conjunction with SSCI Inc..

Methods for Manufacturing 3-Dimensional Scaffolds from ECM Powder - In conjunction with Dr. Steve Badylak, Biomedical Engineering, Purdue University and Dr. Steve Nail, Industrial and Physical Pharmacy, Purdue University.

Extracellular Matrix Patches to Modulate Contact Hypersensitivity – In conjunction with Dr. Steve Badylak, Biomedical Engineering

Continuous Quality Verification (CQV) System – In conjunction with the Consortium for the Advancement of Manufacturing Processes.

EDITORIAL AND REVIEWING ACTIVITIES

Member Editorial Board of the *Journal of Pharmaceutical Sciences*

Reviewer for *Journal of Pharmaceutical Sciences*

Reviewer for *Pharmaceutical Research*

Reviewer for *Journal of Crystal Growth and Design*

Reviewer for *Journal of Pharmaceutical Technology Today*.

PROFESSIONAL SOCIETY ACTIVITIES

Joint FDA-IND workshop on Polymorphs in Pharmaceuticals.

Chair AAPS PDD Awards Committee 2001-2002.

Member Program Committee for AAPS Annual Meeting 2002.

Participant in AAPS Undergraduate Roundtable and AAPS Education Committee

PUBLICATIONS

Karickhoff, S. W. and Morris, K. R. Sorption dynamics of hydrophobic pollutants in sediment suspensions. *Environmental Toxicology and Chemistry*. **4**:469-479 (1985).

Karickhoff, S. W. and Morris, K. R. Impact of tubificid oligochaetes on pollutant transport in bottom sediments. *Environmental Sciences and Technology*. **9** (1):51-56 (1985).

Chawla, M., Pinal, R., Morris, K. R., and Yalkowsky, S. H. Cosolvency I: Non-hydrogen bonding solutes with non-hydrogen bonding solvents. *Toxicological and Environmental Chemistry*. **15** (4):237-247 (1987).

Morris, K. R. and Yalkowsky, S. H. A solubility of aromatic pollutants in mixed-solvents. *Chemosphere*. **17** (2):285-298, (1988).

Karickhoff, S. W. and Morris, K. R. Pollutant sorption: relationship to bioavailability. In Dixon, K. L., Maki, A. and Brungs, W. A. (eds.) Proc. of 6th Pelston Workshop, *Fate and Effects of Sediment Bound Chemicals in Aquatic Systems*. Pergamont, Florissant, CO, 1988

Bugay, D. E. and Morris, K. R. Polymorphic characterization by ³¹P Solid State NMR. *Texas A&M NMR Newsletter*, No. 374, 1989.

Wesdyke, R., Joshi, Y., Jain, N., Morris, K., and Newman, A. The effect of size and mass on the film thickness of beads coated in fluidized bed equipment. *International Journal of Pharmaceutics*. **65**:69-76 (1990).

Mishra, D., Yalkowsky, S. H., and Morris, K. R. Dependence of vapor-pressure of solids and liquids on various thermodynamic parameters. *Chemosphere*. **21** (1-2):107-110 (1990).

Morris, K. R., Knipp, G.T., and Serajuddin, A. T. M. Structural properties of Polyethylene Glycol-Polysorbate 80 mixtures, a solid dispersion vehicle. *Journal of Pharmaceutical Sciences*. **81**:1185-1188 (December 1992).

Wasacz, F., M., Strand, S. W., Bugay, D., and Morris, K. R. The characterization of the hydration state of pharmaceuticals by variable temperature diffuse reflectance infrared spectroscopy. In *Proc. 8th International Conference on Fourier Transform Spectroscopy*, Abstract # 1575, p. 143 1992.

Morris, K., and Rodriguez, N. Hydrates. In Swarbrick, J. and Boylan, J. C. (eds.) *Encyclopedia of Pharmaceutical Technology*, Vol. 7, Marcel Dekker Inc, 1993 pp. 393-440.

Thakur, A. B., Morris, K. R., Jerzewski, R. L., Wadke, D. A., and Carstensen, J. T. Mechanism and kinetics of magnesium ion-mediated degradation of fosinopril sodium. *Pharmaceutical Research*. **10** (6):800-809 (June 1993).

Brittain, H.G., Morris, K. R., Bugay, D. E., Serajuddin, A. T., and Thakur, A. B. Solid-state NMR and IR for the analysis of pharmaceutical solids: polymorphs of fosinopril sodium. *Journal of Pharmacy and Biomedical Analysis*. **11** (11-12):1063-1069 (November - December 1993).

Morris, K. R., Newman, A. W., Bugay, D. E., Ranadive, S. A., Singh, A. K., Szyper, M., Varia, S. A., Brittain, H. G., and Serajuddin, A. T. M. Characterization of humidity-dependent changes in crystal properties of a new HMG-CoA reductase inhibitor in support of its dosage form development. *International Journal of Pharmaceutics*. **108**:195-206 (1994).

Morris, K. R., Fakes, M. G., Thakur, A. B., Newman, A. W., Singh, A. K., Venit, J. J., Spagnuolo, C. J., and Serajuddin, A. T. M. An integrated approach to the selection of optimal salt form for a new drug candidate. *International Journal of Pharmaceutics*. **108**:209-217 (1994).

Friberg, S. E., Moaddel, T., Morris, K. R., Abramowitz, R., and Amsberry, K. L. A Lamellar liquid crystal with fosinopril sodium. *Journal of Pharmaceutical Sciences*. **83** (5):677-679 (May 1994).

Morris, K. R. First order phase transitions in pharmaceutical systems. In *Proceedings of the 36th Annual International Industrial Pharmaceutical Research Conference on A Stability, Instability and Product Quality: Mechanisms and Prediction* July 1994.

Morris, K. R., Evans, S. A., Mackenzie, A. P., Scheule, D., and Lordi, N. G. Prediction of lyophile collapse temperature by dielectric analysis. *Journal of Pharmaceutical Science and Technology*. **48** (6):318-329 (November - December 1994).

Evans, S. A., Morris, K. R., Mackenzie, A. P., and Lordi, N. G. Dielectric characterization of thermodynamic first order events in model systems intended for lyophilization. *PDA Journal of Pharmaceutical Science and Technology*. **49 (1)**:2-8 (January - February 1995).

Wang, Z., Morris, K. R., and Chu, B. Aggregation behavior of fosinopril sodium: a new angiotensin-converting enzyme inhibitor. *Journal of Pharmaceutical Sciences*. **84 (5)**: 609-613 (May 1995).

Guo, R., Compo, M., Friberg, S., and Morris K. R. The coupling action of a hydrotrope and structure transition from Lamellar liquid crystal to bicontinuous microemulsion. *Journal of Dispersion Science and Technology*. **17**:493 (1996).

Guma, N., Kale, K., and Morris, K. R. An investigation of film curing stages using DEA and physical characterization. *Journal of Pharmaceutical Sciences*. **86 (3)**:329-334 (March 1997).

Morris, K. R. Structural characteristics of crystalline hydrates. In Brittain, H.G. (ed.). *Polymorphs in Pharmaceutical Solids*, Marcel Dekker, 1998 pp. 125-181.

Morris, K. R., Nail, S. L., Peck, G. E., Byrn, S. R., Griesser, U. J., Sotwell, J. G., Hwang, S-J, and Park, K. Advances in pharmaceutical materials and processing. *Pharmaceutical Science and Technology Today*. **1 (6)**:235-245 (Sept. 1998).

Serajuddin, A. T. M., Thakur, A. B., Ghoshal, R. N., Fakes, M., Ranadive, S. A., Morris, K. R., and Varia, S. A. Selection of solid dosage form composition through drug-excipient compatibility testing. *Journal of Pharmaceutical Sciences*. **88 (7)**:696-704 (July 1999).

Morris, K. R., Stowell, J. G., Byrn, S. R., Placette, A. W., Davis, T. D., and Peck, G. E. Accelerated fluid-bed drying using NIR monitoring and phenomenological modeling. *Drug Development and Industrial Pharmacy*. **26 (9)**:985-988 (2000).

Fakes, M. G., Dali, M. V., Haby, T. A., Morris, K. R., Varia, S. A., and Serajuddin, A. T. M. Moisture sorption behavior of selected bulking agents used in lyophilized products. *PDA Journal of Pharmaceutical Science and Technology*. **54 (2)**:144-149 (March-April 2000).

Li, T., Morris, K. R., and Park, K. Influence of solvent and crystalline supramolecular structure on the formation of etching patterns on acetaminophen single crystals. a study with atomic force microscopy and computer simulation. *Journal of Physical Chemistry B*. **104**:2019-2032 (2000).

Morris, K. R., Schlam, R.F., Cao, W., and Short, M. S. Determination of average crystallite shape by X-ray diffraction and computational methods. *Journal of Pharmaceutical Sciences*. **89 (11)**:1432-1442 (2000). Published online *Journal of Pharmaceutical Sciences* (15 September 2000).

- Li, T., Morris, K. R., and Park, K. Influence of tailor-made additives on etching patterns of acetaminophen single crystals. *Pharmaceutical Research*. **18** (3):398-402 (2001).
- Chen, X., Bates, S., and Morris, K. R. Quantifying amorphous content of lactose using parallel beam X-ray powder pattern diffraction and whole pattern fitting. *Journal of Pharmaceutical and Biomedical Analysis*. **26**:63-72 (2001).
- Ufret, C. and Morris, K. R. Modeling of powder blending using on-line near-infrared measurements. *Drug Development and Industrial Pharmacy*. **27** (3):719-743 (2001).
- Morris, K. R., Griesser, U. J., Eckhardt, C. J., and Stowell, J. G. Theoretical approaches to physical transformations of active pharmaceutical ingredients during manufacturing processes. *Advanced Drug Delivery Reviews* **48**:91-114 (2001).
- He, X., Stowell, J. G., Morris, K. R., Pfeiffer, R. R., Li, H., Stahly, G. P., and Byrn, S. R. Stabilization of a metastable polymorph of 4-methyl-2-nitroacetanilide by isomorphic additives. *Crystal Growth & Design* **1** (4):305-312 (2001).
- Wildfong, P. L. D., Samy, A-S., Corfa, J., Peck, G. E., and Morris, K. R. Accelerated fluid bed drying using NIR monitoring and phenomenological modeling: Method assessment and formulation suitability. *Journal of Pharmaceutical Science* **91** (3):631-639 (2002)
- Li, T., Park, K., and Morris, K. R. Understanding the formation of etching patterns using a refined monte carlo simulation model. *Journal of Crystal Growth* **2** (3):177-184 (2002) Published online *Crystal Growth and Design* (28 March 2002).
- Li, T., Wen, H., Park, K., and Morris, K. R. How specific interactions between acetaminophen and its additive 4-methylacetanilide affect growth morphology: elucidation using etching patterns. *Crystal Growth and Design*. **2** (3):185-189 (2002). Published online *Crystal Growth and Design* (28 March 2002).
- Chen, X., Li, T., Morris, K. R., and Byrn, S. R. Crystal packing and chemical reactivity of two polymorphs of flufenamic acid with ammonia. *Molecular Crystals and Liquid Crystals*. **381**:121-131 (2002).
- Cao, W., Bates, S., Peck, G. E., Wildfong, P. L. D., Qiu, Z., and Morris, K. R. Quantitative determination of polymorphic composition in intact tablets by parallel-beam X-ray powder diffractometry. *Journal of Pharmaceutical and Biomedical Analysis*. **30**:1111-1119 (2002).
- Chen, X., Morris, K. R., Griesser, U. J., Byrn, S. R., and Stowell, J. G. Reactivity differences of indomethacin solid forms with ammonia gas. *Journal of American Chemical Society*. **124** (50):15012-15019 (2002). Published online *Journal of American Chemical Society* (22 November, 2002).

Wang , J.J., Li, T. L., Bateman, S.D., and Erck, R. Modeling of adhesion in tablet compression - I. Atomic force microscopy and molecular simulation. *Journal Of Pharmaceutical Sciences*. **92 (4)**: 798-814 (2003).

Hilden, L. and Morris, K. Prediction of the Relaxation Behavior of Amorphous Pharmaceutical Compounds. I. Master Curves Concept and Practice. *Journal of Pharmaceutical Sciences*. **92(7)**: 1464-1472 (2003). Published online *Journal of Phamaceutical Science* (25 April, 2003)

Li, T., Donner, A. D., Chol, C. Y., Frunzi, G. P., and Morris, K. R. A statistical support for using spectroscopic methods to validate the content uniformity of solid dosage forms. *Journal of Pharmaceutical Sciences*. **92 (7)**: 1526-1530 (2003). Published online *Journal of Pharmaceutical Sciences* (28 April, 2003).

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PRESENTATIONS (other than teaching)

Karickhoff, S. W. and Morris, K. R. Sorption dynamics of hydrophobic pollutants in sediment suspensions. Poster presentation: Gordon Research Conference; Environmental Section, Concord, New Hampshire, 1982.

Morris, K. R. and Yalkowsky, S. H. Predicting mixed solvent solubilities of hydrophobic pollutants. Poster presentation: AAPS Regional Meeting, Reno, Nevada, 1987.

Bugay, D. E., Morris, K. R., and Brittain, H. G. Quantitative determination of polymorphism in fosinopril sodium using solid state ³¹P and ¹³C NMR spectroscopy. Poster presentation: AAPS National Meeting, Orlando, FL, 1988.

Wesdyke, R., Joshi, Y., Jain, N., Morris, K. R., and Newman, A. W. The effect of size and mass on the film thickness of beads coated in fluidized bed equipment. Poster presentation: AAPS National Meeting, Atlanta, GA, 1989.

Morris, K. R., Bugay, D. E., Serajuddin, A. T. M., Brittain, H. G., and Thakur, A. B. Investigation of polymorphism of fosinopril sodium a new ACE Inhibitor. Poster presentation: AAPS National Meeting, Atlanta, GA, 1989.

Morris, K. R., Knipp, G., and Serajuddin, A. T. M. Structural properties of Polyethylene Glycol: Polysorbate 80 mixtures, a solid dispersion vehicle. Poster presentation: AAPS National Meeting, Atlanta, GA, 1989.

Morris, K. R., Bugay, D. E., Serajuddin, A. T. M., Brittain, H. G., and Thakur, A. B. Investigation of polymorphism of fosinopril sodium a new ACE Inhibitor, Invited paper: 3rd Annual Midwest Organic Solid-State Chemistry Symposium, Purdue University, West Lafayette, IN, June 1990.

Morris, K. R., Amsberry, K. L., Wang, Z., and Serajuddin, A.T. M. Some pharmaceutical applications of laser light scattering. Podium presentation: AAPS National Meeting, Washington, DC, 1991.

Morris, K. R., Newman, A. W., Bugay, D. E., Ranadive, S. A., Szyper, M., Varia, S. A., Brittain, H. G., and Serajuddin, A. T. M. Humidity dependent changes in crystalline properties of an organic hydrate in bulk material and in solid dosage forms. Poster presentation: AAPS National Meeting, Washington, DC, 1991.

Bugay, D. E., Morris, K. R., Findlay, W. P., and Lambarski, D. P. Where did the IR peaks go? Comparison of diffuse reflectance and KBr pellet sampling techniques for hydrate characterization by FTIR spectroscopy. Podium presentation: AAPS National Meeting, Washington, DC, 1991.

Thakur, A. B., Morris, K. R., Jerzewski, R. L., Wadke, D. A., and Carstensen, J. T. Kinetics of magnesium ion-mediated degradation of fosinopril sodium. Podium presentation: AAPS National Meeting, Washington, DC, 1991.

Serajuddin, A. T. M., Thakur, A. B., Ghoshal, R. N., Ranadive, S. A., Knipp, G. T., Fakes, M. G., and Morris, K. R. Drug-excipient compatibility screening: a practical model. Poster presentation: AAPS National Meeting, Washington, DC, 1991.

Desai, D. S., Rubitski, B.A., Varia, S. A., Newman, A. W., and Morris, K. R. Physical interactions of different lubricants with starch-derived disintegrants and their effects on capsule dissolution. Poster presentation: AAPS National Meeting in Washington, DC, 1991.

Strand, S. W., Bugay, D. E., and Morris, K. R. Application of FTIR reflection spectroscopy in the study of material at elevated temperature. Abstract #857, Pittsburgh Conference, Chicago, IL, 1991.

Morris, K. R., Evans, S. A., Mackenzie, A. P., and Lordi, N. G. Optimization of lyophilization using dielectric analysis. Poster presentation: AAPS Eastern Regional Meeting, New Brunswick, NJ, 1992.

Morris, K. R. A structural approach to the characterization of crystalline hydrates. Invited Talk: University of Arizona, Tucson, AZ, 1992.

Morris, K. R., Newman, A. W., and Bugay, D. E. The effect of particle size on the structural and energetic characterization of pharmaceutical solids. Invited Talk: The Symposium on

Pharmaceutical Solids, Fine Particle Society National Meeting, Las Vegas, Nevada, July 1992.

Morris, K. R., Evans, S. A., Mackenzie, A. P., and Lordi, N. G. Prediction of lyophile collapse temperature using dielectric analysis. Invited Talk: The Symposium on the Effect of Water on the Molecular Motion of Pharmaceutical Solids, Madison, Wisconsin, September 1992.

Pazdan, J., Amsberry, K. L., and Morris, K. R. Statistical aspects of dynamic light scattering. Podium presentation: AAPS, San Antonio, TX, November 1992.

Morris, K. R., Gougoutas, J. G, and Malley, M. Physical characterization of crystalline hydrates of pharmaceutical compounds. Invited Talk: Chemistry Symposium, Rutgers College, Rutgers University, New Brunswick/Piscataway, NJ, May 1993.

Morris, K. R. First order phase transitions in pharmaceutical systems. Invited Talk: 36th Annual International Industrial Pharmaceutical Research Conference (Wisconsin Land of Lakes), Merriac, WI, July 1994.

Morris, K. R. First order phase transitions in preformulation studies and process development. Invited Talk: Philadelphia Discussion group, Philadelphia, PA, December 1994.

Guma, N., Kale, K., and Morris, K. R. An investigation of film curing stages using DEA and physical characterization. Invited Talk: Purdue-Wisconsin Symposium on Water in Pharmaceutical Solids, Purdue University, West Lafayette, IN, September 1995.

Morris, K. R. Structural aspects of crystalline hydrates. Invited Talk: Joint FDA-AAPS Symposium on Polymorphism, Washington, DC, February 1996.

Morris, K. R.. A prediction of crystal morphology and its potential impact on dehydration kinetics of crystalline hydrates. Invited Talk: College of Pharmacy, University of Michigan, Ann Arbor, MI, September 1996.

Morris, K. R. and Ku, C. Classification and characterization of protein hydration. Poster presentation: Purdue-Wisconsin Symposium on Water in Pharmaceutical Solids, Purdue University, West Lafayette, IN, September 1997.

Sarsfield, B. A., and Morris, K. R. Polymorph control during a BMS compound crystallization step and the role of Cerius². Poster presentation: International Symposium on New Approaches to Pharmaceutical Development, San Diego, CA, February 1998.

Griesser, U. J., Morris, K. R. and Byrn, S. R. Structural changes in orotic acid monohydrate upon dehydration: an uncommon crystalline hydrate. Poster presentation:

International Symposium on New Approaches to Pharmaceutical Development, San Diego, CA, May 1998.

Morris, K. R. and Bowman B. Determining morphology based flow characteristics of APAP using PXRD, Cerius² and Optical Microscopy, Invited Talk: International Symposium on New Approaches to Pharmaceutical Development, Paris, France, May 1998 and previously, San Diego, CA, 1998.

Morris, K. R. Hydrate Characteristics and the pharmaceutical development process. Invited Talk. Purdue University, West Lafayette, IN, June, 1998.

Morris, K. R. Crystallization and polymorphism issues in controlled release dosage forms. Controlled Release Society Workshop, Las Vegas, NV, June 1998.

Li, T., Morris, K. R., and Park, K. Fractal analysis of acetaminophen crystal during dissolution. Poster presentation: AAPS National Meeting, San Francisco, CA, November 1998.

Te, R., Griesser, U. J., Morris, K. R., Stowell, J. G., and Byrn, S. R. Solid state investigation of thiamine hydrochloride. Poster presentation: AAPS National Meeting, San Francisco, CA, November 1998.

Chen, X., Griesser, U. J., Joshi, V., Te, R., Stowell, J. G., Pfeiffer, R., Morris, K. R., and Byrn, S. R. Solid state acid-base reaction of indomethacin. Poster presentation: AAPS National Meeting, San Francisco, CA, November 1998.

Griesser, U. J., Morris, K. R., and Byrn, S. R. Solid state properties and structural characterization of orotic acid crystal forms. Poster presentation: AAPS National Meeting, San Francisco, CA, November 1998.

Li, T., Morris, K. R., and Park, K. A study of etching mechanism of acetaminophen single crystals with atomic force microscopy and computer simulation. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Habib, Y., Young, G., Abramowitz, R., and Morris, K. R. Effect of superdisintegrants and magnesium stearate on the conversion of anhydrous lactose to α -lactose monohydrate. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

He, X. R., Stowell, J. G., Morris, K. R., Stahly, P. G., and Byrn, S. R. Control of crystallization of a metastable polymorph by tailor-made additives. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Hu, Y., Stowell, J. G., Morris, K. R., and Byrn, S. R. Solid-state stability of the crystalline and amorphous lisinopril. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Chen, X., Stowell, J. G., Pfeiffer, R. R., Morris, K. R., and Byrn, S. R. Solid-state acid-base reaction between flufenamic acid and magnesium excipients. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Chen, X., Stowell, J. G., Pfeiffer, R. R., Morris, K. R. and Byrn, S. R. Study of solid-state acid-base reactions between indomethacin and sodium carbonate by TG, FT-IR and XRPD. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Te, R. L., Morris, K. R., Stowell, J. G., and Byrn, S. R. Effect of dehydration on the oxygen reactivity of prednisolone t-butyl acetate. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Morris, K. R. Polymorphic and solvation changes during processing. Poster presentation: AAPS National Meeting, New Orleans, LA, November 1999.

Davis, T. D., Morris, K., R., Stowell, J. G., Byrn, S. R. Phase transformation during wet granulation. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000.

Hu, Y., Stowell, J. G., Morris, K. R., and Byrn, S. R. Stabilization of amorphous dipeptide angiotensin-converting enzyme (ACE) inhibitors with excipients. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000

Bi, M. and Morris, K. R. Correlation of hygroscopicity and molecular and crystal structures using genetic function approximation method. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000.

Li, T., Morris, K., and Park, K. Influence of tailor-made additives on the formation of etching patterns of acetaminophen single crystals. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000.

Chen, X., Stowell, J. G., Pfeiffer, R. R., Morris, K. R., and Byrn, S. R. Reactivity differences of two polymorphs of flufenamic acid in solid-state acid-base reactions. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000.

Qiu, Z., Morris, K. R., Stowell, J. G., and Byrn, S. R. Solid state Maillard reaction between metoclopramide hydrochloride and lactose. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000.

Abraham, L. R., Cao, W., Davis, T. D., Findlay, W., Morris, K. R., and Nail, S. L. The effect of mannitol, human serum albumin and moisture content on the molecular mobility of amorphous sucrose. Poster presentation: AAPS National Meeting, Indianapolis, IN, October 2000.

Morris, K. R. Etching study of acetaminophen crystals. Invited Talk. Molecular Crystallization Consortium Meeting, Amsterdam, The Netherlands, March 2001.

Davis, T.D., Morris, K. R., Stowell, J. G., Byrn, S. R., Placette, A. W., and Peck, G.E. Accelerated Fluid Bed Drying Using NIR Monitoring and Phenomenological Modeling, Jenkins/Knevel Award for Excellence in Research; West Lafayette, IN, April 2001.

Morris, K. R. Determination of average crystalline shape. Invited Talk. College of Pharmacy, University of Arizona, Tucson, AZ, May 2001.

Davis, T.D., Stowell, J.G., Morris, K.R., and Byrn, S.R. Phase Transformations During Wet Granulation. Midwest Organic Solid State Chemistry Symposium XII, Lincoln, NE, June, 2001.

Morris, K. R. Average crystalline shape: Determination by use of X-ray. Invited Talk. Department of Chemistry, University of Dayton, Dayton, OH, September 2001.

Morris, K. R.. Etching patterns of acetaminophen crystal surfaces. Invited Talk. Department of Chemistry, Eastern Michigan University, Ypsilanti, MI, October 2001.

Morris, K. R. Phonons and persistent meta-stable forms. Invited Talk and symposium organizer/moderator. AAPS National Meeting, Denver CO, October 2001.

Morris, K. R. Etching study of acetaminophen crystals. Invited Talk. College of Pharmacy, University of Minnesota, Minneapolis, MN, December 2001.

Wildfong, P., Cao, W., Peck, G. and Morris, K. R. Poster Crystal Form Changes During Tablet Compaction. Presentation. Industrial Advisory Board Meeting for National Science Foundation Center for Pharmaceutical Processing Research, Purdue University, West Lafayette, IN, November 2001

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